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ABSTRACT

The major purpose of this study was to examine the relationship between play complexity, occupational preference, and perceived self-competence. A second focus was to examine these variables in terms of age, gender, and socioeconomic status (SES). Two age groups (200 third graders and 206 sixth graders) participated in the initial part of the study. Two years later, 174 students from the original sample were further classified according to gender and SES. In order to assess game complexity, a playground log was administered to collect information about activities pursued by each child. Activities were identified and assigned scores on seven dimensions derived from Lever's factor analysis of game complexity. In addition, scores from Harter's Perceived Self-Competence Scale for Children, a 16-scale interest inventory, and four occupational complexity scores were subjected to a multivariate analysis of variance. Findings indicate that (1) children who participated in games of greater complexity tended to see themselves later as more socially and physically competent and to prefer occupations which involved more complex interactions of data, people, and things: (2) a gender disparity found for both game complexity and occupational complexity suggests that greater exposure to complex games may give boys an advantage over girls in occupational settings that have structural features common to those games, and (3) although no SES differences in complexity of play were found, lower SES children appeared to be less discriminating and less differentiated in their occupational preferences and tended to see themselves as less socially and physically competent than middle SES children. (LH)

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"CHILDREN'S GAME COMPLEXITY AS A PREDICTOR OF LATER PERCEIVED SELF COMPETENCE AND OCCUPATIONAL INTEREST"*

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Children's Game Complexity as a Predictor of Later Perceived Self Competence and Occupational Interests

Although there is evidence for a relationship between parental workplace experiences and childrearing decisions (Kohn, 1977; Kohn & Schooler, 1976; Mortimer, 1976; Mortimer & Lorence, 1981), there is little information regarding the predictive association between children's individual social experiences and personal attributes and their subsequent occupational preferences. In other words, we know relatively little about the connections between social structure and personality in children.

We do know that participation in games and play activities is a major pastime of elementary school aged children (Lever, 1978). Indeed, active engagement in organized games has been said to constitute the work of childhood and to prepare children for roles in adult occupations (Gilligan, 1982; Lever, 1978). Children's play activities have been characterized on the basis of dimensions of structural complexity which include: the number of participants, roles of participants, interdependence of play roles, rules of play, team formation, and size of group (Lever, 1978).

Adult occupations in turn have been viewed along the lines of their structural complexity. In considering occupational complexity, researchers have paid particular attention to the extent to which workers' usual activity on the job involves data (facts and figures), people (supervisors, subordinates, co-workers, and clients), and things (tools, materials, equipment, and goods) (Cain & Treiman, 1981; Spenner, 1981). Ranges of

complexity have been described for experiences in each of these areas. For data, complexity ranges from comparing to synthesizing; for people, from taking instructions to mentoring; and for things, from handling to setting up (Cain & Tremain, 1981; United States Employment Service, 1977). If competencies, motives, and skills are acquired in the context of day to day work life, then opportunities for skill acquisition depend on the structural complexity of the job itself.

Given that both children's play and adult occupations have been described in terms of structural complexity, we explored the extent to which the complexity of children's school playground activities was related to the complexity of their occupational preferences made two years later. The predictive rather than concurrent relation between these two variables was of interest because of the preparatory function attributed to children's play activities (Gilligan, 1982; Lever, 1978; Csikszentiminalyi, 1982).

Although both play and occupations have been described in terms of structural complexity, the predictive relation between activity in complex games and a preference for occupations with complex skill demands may be mediated by perceived self competence. Positive self evaluations develop from self efficacious action, and managing the environment successfully is likely to result in the acquisition of a positive sense of self (Gecas & Schwalbe, 1983). In the sociological literature, children's self esteem has not typically been construed as perceived self competence in spheres such as sports and

friendships with peers. Indeed, recent studies viewing self esteem in children in global terms have yielded disappointing results which have been attributed to inadequate conceptualizations of self esteem (Rosenberg & Pearlin, 1980; Wells & Rankin, 1983). Following Harter (1982), we viewed self esteem as a multidimensional construct with component parts of cognitive, physical, and social competence as well as global self esteem. Frequent participation in activities that demand high levels of social, athletic, and cognitive problem solving skills may foster the development of positive attitudes regarding one's personal abilities in these areas (Waters & Sroufe, 1983). Thus, a primary purpose of the study was to examine the extent to which participants in competitive games with many rules, roles, and participants would two years later come to view themselves as highly efficacious and would also prefer occupational roles involving complex work.

A secondary focus of this study was to examine age, gender, and socioeconomic differences in play complexity, occupational preferences, and perceived self competence. Findings of age differences in children's play (Rubin, Fein, & Vandenberg, 1983) have been explained as dependent upon emergent cognitive abilities. Piaget (1962), for example, suggested that engaging in rule-governed play assumed the existence of concrete operational skills. Age differences in preferences for adult occupations have not been studied extensively, but do suggest that older children's occupational preferences are more differentiated and more discriminating than those of younger

children because of their greater understanding of the component roles of various occupations (MacKay & Miller, 1983). Age differences have not been noted in the area of perceived self competence (Harter, 1982).

Gender differences have been found in each of the areas of interest. Boys are more frequent players in competitive team games such as soccer, basketball, and football, whereas girls typically pursue play at less competitive games such as hopscotch (Borman & Kurdek, 1983; Lever, 1978). Boys have also been found to express a stronger preference than girls for more complex occupational roles, especially those dealing with things (MacKay & Miller, 1983). Gender differences in perceived self competence have occurred mainly in the area of physical competence, with boys seeing themselves as more competent than girls (Harter, 1982).

Findings with regard to SES differences indicate that children from lower SES backgrounds engage in cognitively less mature play than do children from lower SES backgrounds. Children from lower SES backgrounds have also been found to prefer less complex occupations than children from middle class backgrounds (MacKay & Miller, 1983; Sewell & Hauser, 1975) perhaps because the childrearing practices of middle class parents foster high achievement which, in turn, is linked to the choice of complex occupations (Kohn & Schooler, 1983). SES differences have not been examined for the specific aspects of perceived self competence of interest here.

In sum, we expected to find age, gender, and SES differences

for both game complexity and occupational preferences. Specifically, complex play was expected to be more prevalent for older children, for boys, and for children from middle class backgrounds. Preferences for complex occupations were expected to follow a similar pattern. Age differences have not been found with regard to the dimensions of perceived self competence of interest here, and gender differences have been found in the area of physical competence. We expected to replicate these findings, and explored possible SES differences. Finally, given the linkage between the complexity of play and both perceived self competence and preference for complex occupations, we expected complexity of play to be a significant predictor of both perceived self competence and preference for occupational complexity.

Method

Subjects

In the earlier study of game complexity, participants included 200 third graders and 206 sixth graders. These same children were in the fifth and eight grades, respectively, when the perceived self competence and occupational preference data were collected. Two-year attrition resulted from student transfer (10%), student drop out (15%), or parental refusal of cooperation (15%). Thus, the sample on whom the current set of analyses was performed included 87 younger and 87 older children who were further classified according to gender (boys, girls) and SES (low and middle). The number of children in each of the six cells of the design is given in Table 3.

Children from the low and middle SES groups were recruited from three distinct locations of Cincinnati. Low SES children were drawn from a predominantly urban Appalachian neighborhood school while middle SES children were drawn from two schools, one serving a lower middle class community in the same city school district and the other serving a similar community in a suburban location. Classification of children into one of the two SES groups was validated by assigning prestige scores from the Duncan Socioeconomic Index to children's listing of maternal and paternal occupations. Maternal occupation was given by 77 percent of the children, and paternal occupation by 94 percent of the children. For each parent, prestige ratings were significantly higher for the middle rather than the lower SES group. Respective means for the maternal occupation were 37.13 and 26.91 (F (1, 75) = 13.03, P .001). Respective means for the paternal occupation was 44.89 and 30.09 (F (1, 92) = 34.24, P

Game complexity. In order to assess game complexity, teachers administered a playground log following lunch recess for a 15 day period during the fall of the school year when children were in the third and sixth grades respectively. Logs provided information about the activity pursued by each child through either a written description of the activity or a choice of an illustration of the activity. These logs were validated through observation and careful monitoring of the data collection process by the first author and three trained graduate students. Activities were identified and assigned scores on seven dimensions derived from Lever's (1978) factor analysis of game

complexity. These dimensions and score weights are presented in Table 1. A cluster analysis using Taccard's coefficient as

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Insert Table 1 about here

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the similarity index yielded four clusters which differed in level of complexity. The activities are grouped by complexity level in Table 2. Mean complexity scores, ranging from 1 to 4, were derived by weighting each reported activity by the complexity score indicated in the last column of Table 2, summing

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Insert Table 2 about here

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these weighted scores, and then dividing by the total number of reported activities.

Perceived self competence. Harter's (1979) Perceived Self Competence Scale for Children requires children to rate themselves in four general areas of competence: Physical Competence, Social Competence, Cognitive Competence, and Self Esteem. Each area is represented by seven pairs of statements reflecting opposing views of oneself in a given area of competence (e.g., Some kids find it hard to make friends BUT for other kids it's pretty easy). Children first had to decide which item of the pair better described them and then had to rate whether that item was "Sort of True" or "Really True" of them. Scores for each item, then, ranged from 1 to 4. Composite scores for each of the four areas were computed by summing the scores of

the items in that area. Low scores reflected high competence. Cronbach alphas for the composite scores ranged from .53 to .59.

Interest Inventory: Occupations and Activities. The Interest Inventory was developed as part of Project Talent and required children to rate the extent to which they liked 122 occupations and 83 activities. This Inventory provides a wide range of items which probe attitudes toward occupations and occupationally related activities (DiMaggio, 1983). Two sets of scores were derived from children's ratings. The first was a set of 17 a priori interest scales which were derived for use in Project Talent. These included: Mechanical-Technical, Skilled Trades, Physical Science, Biological Science, Public Service, Business-Management, Computational, Office Work; Sales, Outdoor Recreation, Sports, Farm and Ranch, Literary/Linguistic, Musical, Artistic, Labor, and Social Services. Scores for these scales were derived by summing the interest rating given for the occupation/activity included in the scale and dividing this sum by the total number of occupation/activities involved. Thus, scores for each scale ranged from 1 to 5, with a low score indicating high interest. Cronbach alphas for the composite scale scores ranged from .69 to .91.

The second set of scores derived involved a coding of the 122 occupations. The Dictionary of Occupational Titles (United States Employment Service, 1977) contains a listing of these occupations in reference to how much the occupation requires a worker to function with data, people, and things. Codes for each of these three areas ranged in level of complexity: Data (1=

Synthesizing to 7= Comparing), People (1= Mentoring to 9= Taking Instructions/Helping), and Things (1= Setting Up to 8= Handling). Data, People, and Things scores were obtained by weighing each of the above codes by the rating the occupation received. Thus, high scores reflected a dislike for low complexity, i.e., a preference for high complexity.

Results

Age, Gender, and SES Differences

Game Complexity, the 16 interest scales, the 4 occupational complexity scores, and the 4 dimensions of self competence were submitted to a 2 (Age) x 2 (Gender) x 2 (SES) multivariate analysis of variance. Significant effects were obtained for Age, Gender, and SES (F (25, 142) ranging from 2.22 to 13.95, $P < .01$). The Age x Gender, Age x SES, and Gender x SES interactions were also significant (F (25, 142) ranging from 1.80 to 1.94, $P < .05$). Relevant means are presented in Table 3. The

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Insert Table 3 about here

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obtained multivariate effects were interpreted by 2 (Age) x 2 (Gender) x 2 (SES) univariate ANOVAs. Scores for which significant univariate effects were obtained, and the associated F values, are presented in Table 4.

Insert Table 4 about here

The Multivariate Age effect was due to older children having

higher Game Complexity scores than younger children. For each of the 12 interest areas for which univariate effects were obtained (see Table 4), younger children indicated a greater liking than did older children. However, older children showed a stronger liking for complexity relevant to Data, People, and Things than did younger children. No age effects were obtained for any of the dimensions of self competence.

The multivariate Gender effect was due to boys' higher Game Complexity scores, to boys' stronger preference for Physical Sciences, Outdoor Recreation, and Mechanical-Technical areas; to girls' showing greater interest in Literary/Linguistic, Musical, Office Work, Artistic, Computational, and Social Service areas of Data and Things; and to boys' rating themselves as more Socially and Physically competent and having higher self esteem.

The multivariate SES effect was due to the stronger interest of lower rather than middle class children in each of the 13 occupational interest areas for which significant effects were obtained (see Table 4). However, middle SES children showed a greater preference than low SES children for complexity in the areas of Data, People, and Things. Also, relative to low SES children, middle SES children saw themselves as more socially and physically competent.

The pattern of the multivariate Age x Gender interaction was consistent. For the five interest areas for which significant effects were obtained (Table 4), gender differences favoring boys were more marked for older children than for younger children. For the three occupational complexity scores, however, a gender

difference favoring boys occurred only for younger children.

The pattern of the multivariate Age x SES interaction was also consistent. For the 11 interest areas for which significant effects were obtained (see Table 4), low SES children expressed greater liking than middle SES children only for younger children. However, middle SES children preferred complexity in occupations only among younger children. Finally, only younger middle SES children saw themselves as more Physically competent than low SES children.

The pattern of the multivariate Gender x SES effect fluctuated. For Game Complexity, boys had higher scores than girls only at the middle SES level. With regard to interest areas, girls had greater preference than boys for Literary/Linguistic, Artistic, and Social Services only at the middle SES level, and boys had greater preference than girls for Sports and Outdoor Recreation only at the low SES level.

Relation Between Game Complexity and Both Preference for Occupational Complexity and Perceived Self Competence

Children with high Game Complexity scores in elementary school two years later tended to show a preference for occupational complexity across the board relative to Data (r=.28), People (r=.25), and Things (r=.26), all Ps $<$ .01. These values were reduced in size when the effect of grade was partialled out, but still remained significant (respective rs=.22, .20, and .21 $P < .05$). The only dimension of self competence related to Game Complexity was Physical Competence. Children with high Game Complexity scores tended to see

themselves as physically competent (r=-.20, P < 105). This value was still significant, though reduced in size, when grade was partialled out (r=-.19, P < .05).

Discussion

Age, Gender, and SES Differences

As predicted, we found, age, gender, and SES differences in the variables of interest. Consistent with the findings of Borman and Kurdek (1983), older children engaged in structurally more complex play activities than did younger children. While we also confirmed MacKay and Miller's (1983) finding that with age children's occupational preferences become more discriminating and more differentiated, we can extend that finding to include a developmental trend toward increased preference for occupational complexity. Similar to the earlier findings of Harter (1982), age effects in perceived self competence were nonsignificant.

Concordant with the findings of Lever (1978) and Borman and Kurdek (1983), we found boys' play to be more complex than that of girls. We also found gender differences in children's preference for occupations that follow traditional sex role expectations. Generally, boys preferred physical, outdoor, and mechanical service occupations (cf. Looft, 1971). Like MacKay and Miller (1983), we found boys to have a stronger preference for more complex occupations than did girls, especially for occupations involving interactions with data and things. While like Harter (1982), we found boys to see themselves as more physically competent than girls, we also found boys to see themselves as more socially competent and to have higher self

esteem. Because the dimensions of perceived self competence of interest are not orthogonal (Harter, 1982), it is not surprising that boys' greater perceived physical competence might spill over to social competence and general self esteem.

Although we did not find SES differences in complexity of play (cf. Rubin et al., 1983), we did find differences in occupational preference and perceived self competence. Similar to MacKay and Miller (1983), we found lower SES children to be less discriminating and less differentiated in their occupational preferences than were middle SES children. Although Harter herself has not examined SES differences in her perceived self competence scale, our finding that middle SES children saw themselves as more socially and physically competent that lower SES children is consistent with a trend of lower self evaluations provided by lower SES children (Harter, 1982).

While the main effects summarized above are consistent with available literature, our obtained interactions indicate that age, gender, and SES effects are not independent. Although we found a general age-related increase in occupational differentiation and preference for complex occupations, we found gender differences in job preferences to be more marked for older than for younger children. We also found gender differences in preference for complex occupations to be more marked for younger than for older children. Similarly, while younger lower SES children were the least discriminating in their job preferences, social class differences in preference for job complexity were more salient for younger than for older children. Finally,

social class also interacted with gender. Boys' play was more complex than girls' play only for middle class children; girls' preferences for artistic and social service jobs were stronger for middle class children; and boys' preference for sports and outdoor recreational occupations was stronger at the lower SES level. These findings suggest that future study is needed of the way in which age, gender, and SES effects can offset, buffer, or exaggerate each other.

Game Complexity as a Predictor of Occupational Complexity and Self competence

As predicted, children who participated in games with many rules, roles, and participants developed two years later into children who saw themselves as physically competent and who preferred occupations which involved complex interactions with data, people, and things. These findings indicate that children's play activities do indeed serve an anticipatory socialization function. Although the correlational nature of the data make statements about causality hazardous, it seems likely that children's experiences with structural complexity in game activities may prepare them for the structural complexity of adult roles.

Further, the gender disparity found for both game complexity and adult occupations strengthens Lever's (1978) claim that boys'

greater exposure to complex games may give them an advantage over girls in occupational settings which have structural features common to those games. Finally, the link between play complexity and perceived physical competence indicates that children's evaluations of their own skills are often well grounded.

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Table 1

Dimensions of Playground Activities and Weights Assigned to Dimensions

Dimension	Weight of 0	Weight of 1
Number of participants	undefined	defined
Roles of participants	few (2 or less)	many (3 or more)
Interdependence of player roles	low	high
Rules of play	few, simple	many, complex
Team formation	not required	required
Status of activity	play, not a game	game
Size of group	small (3 or less)	large (4 or more)

Table 2

Playground Activity Clusters

Complexity Level	Activity	Typology	Weight Used to Derive Game Complexity Score
Non-games	Watch others Bars Walk/Talk Run/Jog Academics Work	Non-games	1
Low	Hopscotch Imaginative Play Unstructured Play	Low scores on role differentiation player interdependence, and explicitness of goals. Rules are few, group size is small, and activity is play rather than a game. No teams.	2
Intermediate	Tag 4-Square Tetherball Dodgeball Chasers Jumprope	Low playgroup size, rules are few. Role differentiation but no power. High player interdependence. Activity is game rather than play. No teams.	3
High	Basketball Baseball Kickball Volleyball Soccer Football All colors	High role differentiation, player interdependence, explicitness of goals, and number of rules. Teams.	4

Table 3

Mean Scores by Children's Age, Gender, and SES

SCORE	GRADE 3 MALES Low (n=20)	GRADE 3 MALES Middle (n=25)	GRADE 3 FEMALES Low (n=14)	GRADE 3 FEMALES Middle (n=28)	GRADE 6 MALES Low (n=15)	GRADE 6 MALES Middle (n=35)	GRADE 6 FEMALES Low (n=18)	GRADE 6 FEMALES Middle (n=19)
Game Complexity	2.63	3.34	2.37	1.97	3.25	3.51	2.43	2.56
Physical Science	2.68	3.57	3.15	3.47	3.24	3.43	3.88	3.82
Linguistic	3.08	3.92	2.89	2.88	3.79	3.63	3.43	2.99
Public Service	2.81	3.56	2.87	3.31	3.23	3.05	3.69	3.76
Musical	2.66	3.88	2.60	2.86	4.02	3.56	3.46	3.37
Biological Science	3.04	3.64	3.08	3.10	3.87	3.48	3.48	3.41
Sports	1.68	2.72	2.49	2.44	2.37	2.75	2.95	2.81
Outdoor Recreation	1.95	2.78	3.66	3.63	2.60	3.48	4.02	4.14
Business Management	2.48	3.47	2.58	3.08	3.04	2.96	3.44	3.27
Office Work	3.22	3.93	2.24	2.82	4.10	4.13	2.65	3.39
Artistic	2.50	3.73	2.50	2.69	3.37	3.45	3.05	2.50
Sales	2.86	3.86	2.88	3.46	3.56	3.63	3.63	3.50
Computation	3.15	3.93	3.04	3.32	3.77	3.83	3.64	3.61

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Table 3 (Continued)

	GRADE 3				GRADE 6			
	MALES		FEMALES		MALES		FEMALES	
	Low (n=20)	Middle (n=25)	Low (n=14)	Middle (n=28)	Low (n=15)	Middle (n=35)	Low (n=18)	Middle (n=19)
Skilled Trades	3.24	3.92	3.10	3.48	3.57	3.95	4.02	4.14
Farming and Ranch	2.80	3.79	3.12	3.26	3.40	3.57	3.63	3.61
Social Services	2.91	3.90	2.48	2.72	3.51	3.76	3.03	2.92
Mechanical	2.66	3.75	3.24	3.57	2.94	3.17	4.01	4.16
Labor	3.01	4.00	3.41	3.51	3.60	4.00	3.91	4.40
Data	8.46	11.03	8.14	9.18	10.17	10.45	10.35	10.54
People	18.26	24.02	17.95	20.13	21.83	22.41	22.66	22.79
Things	14.19	18.61	13.56	15.23	17.36	17.39	17.40	16.63
Cognitive	2.61	2.32	2.61	2.50	2.50	2.33	2.41	2.33
Social	2.41	2.10	2.61	2.24	2.14	2.04	2.33	2.26
Physical	2.64	2.21	2.89	2.60	2.19	2.35	2.68	2.51
Self Esteem	2.36	2.20	2.55	2.25	2.05	2.14	2.37	2.51

. For Game Complexity, high score indicates high complexity. For Interest areas (Physical Science through Labor), low score indicates high preference. For Job Complexity score (Data, People, Things), high score inidcates preference for high complexity. For Self Competence scores (Cognitive through Self Esteem), low score indicates high competence.

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Table 4

Summary of Significant F Ratios for Univariate Analysis of Variance Effects

SCORE	EFFECT					
	Age	Gender	SES	Age x Gender	Age x SES	Gender x SES
ume Complexity	16.12**	92.76**				6.33**
ysical Science	7.28**	8.26**	7.57**		5.45*	
terary/	4.27*	20.73**			8.29**	4.92*
blic Service				5.58*	4.15*	
sical	10.36**	6.86**			10.39**	
ological Sciences	5.61*				4.75*	
orts	7.25**		5.20*			7.30**
tdoor Recreation	12.52**	40.48**	8.84**			5.76*
siness Management			5.56*	5.92*	13.51**	
ffice Work	16.85**	67.64**	15.43**			
rtistic		18.16**	3.83*		10.91**	7.96**
les			7.24**		8.35**	
mputation	9.21**	6.51**	6.15**		6.00*	
killed Trades	19.78**		11.58**	9.25**		
rming	4.05*		5.11*			
cial Services	7.67**	43.38**	8.81**		5.51*	5.30*
echanical		26.37**	12.01*	16.11**	5.45*	
bor	23.23**		20.91**	6.28*		
ta	17.35**	4.09*	14.49**	8.49**	10.20**	
eople	13.81**		13.79**	8.84**	11.53**	
ings	11.82**	6.96**	7.88**	5.02*	14.43**	

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Table 4 (Continued)

SCORE	EFFECT					
	Age	Gender	SES	Age x Gender	Age x SES	Gender x SES
elf Competence						
ognitive						
ocial		4.20*	6.14*			
hysical		11.08**	3.83*		4.37*	
elf Esteem		4.94*				

ote. For all effects, F (1,166).

* P < .05.

** P < .01.

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